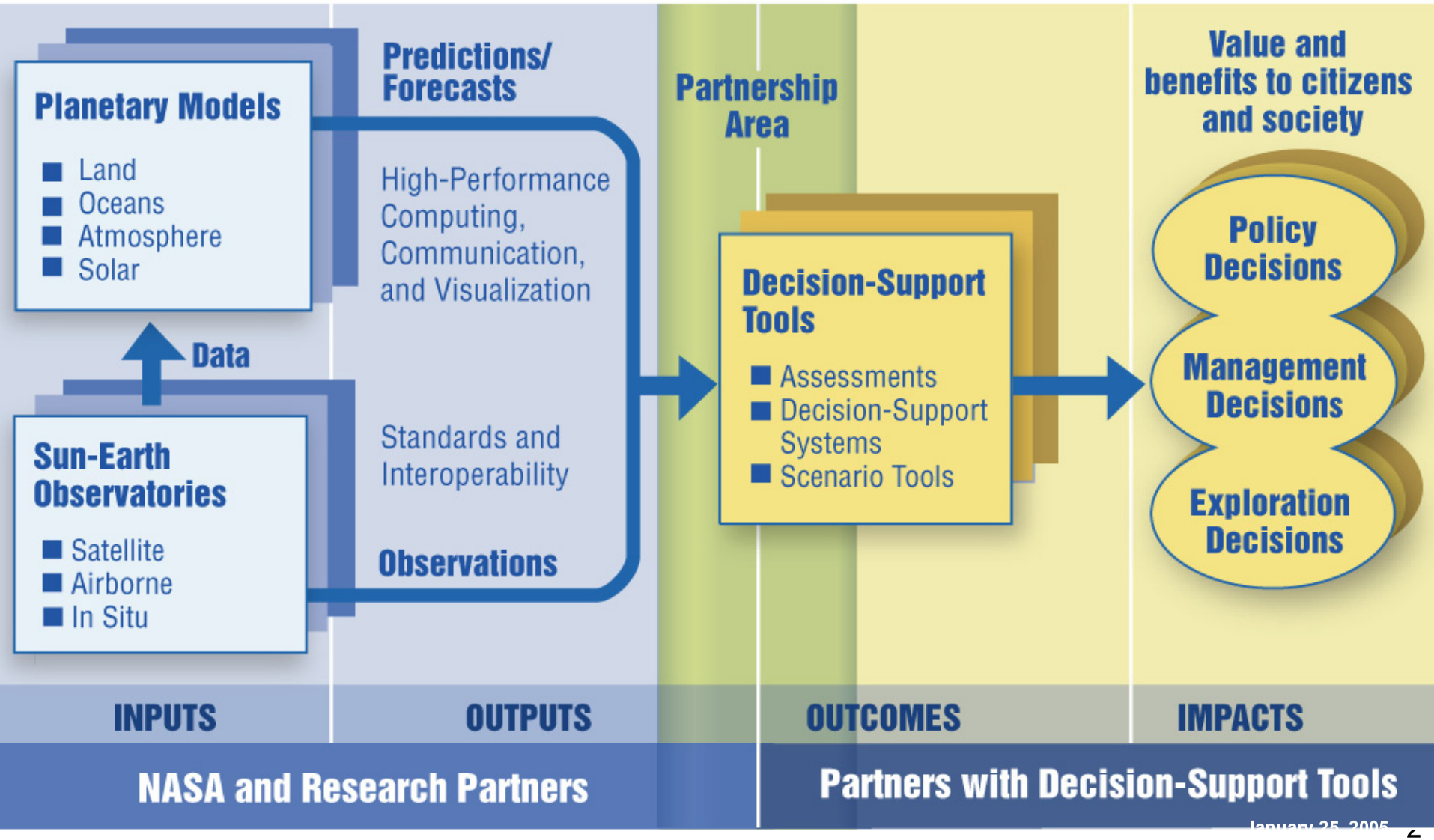
SENH Workshop Summary and Process for Evaluation, V&V and Benchmarking of Decision Support Tools/Systems

Integrating Knowledge, Capacity and Systems into Solutions

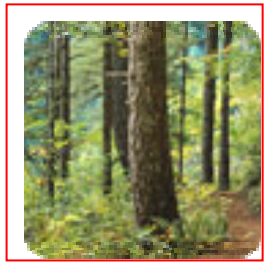


Applications of National Priority

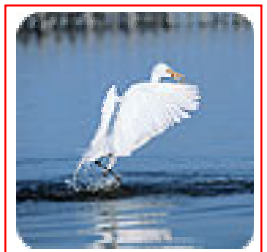
Agricultural Efficiency

Air Quality

Aviation



Carbon Management



Coastal Management

Disaster Management

Ecological Forecasting

Energy Management

Homeland Security

Invasive Species

Public Health

Water Management

Definitions

Decision Support System (DSS) – a computer based information-processing system for scenario optimization through multi-parametric analysis. A DSS utilizes a knowledge base of information with a problem solving strategy that may routinely assimilate measurements and/or model predictions in support of the decision making process. The DSS provides an interface to facilitate human inputs and to convey outputs. Outputs from a DSS would typically be used for making decisions at the local level and outputs from multiple DSSs may be used in establishing policy.

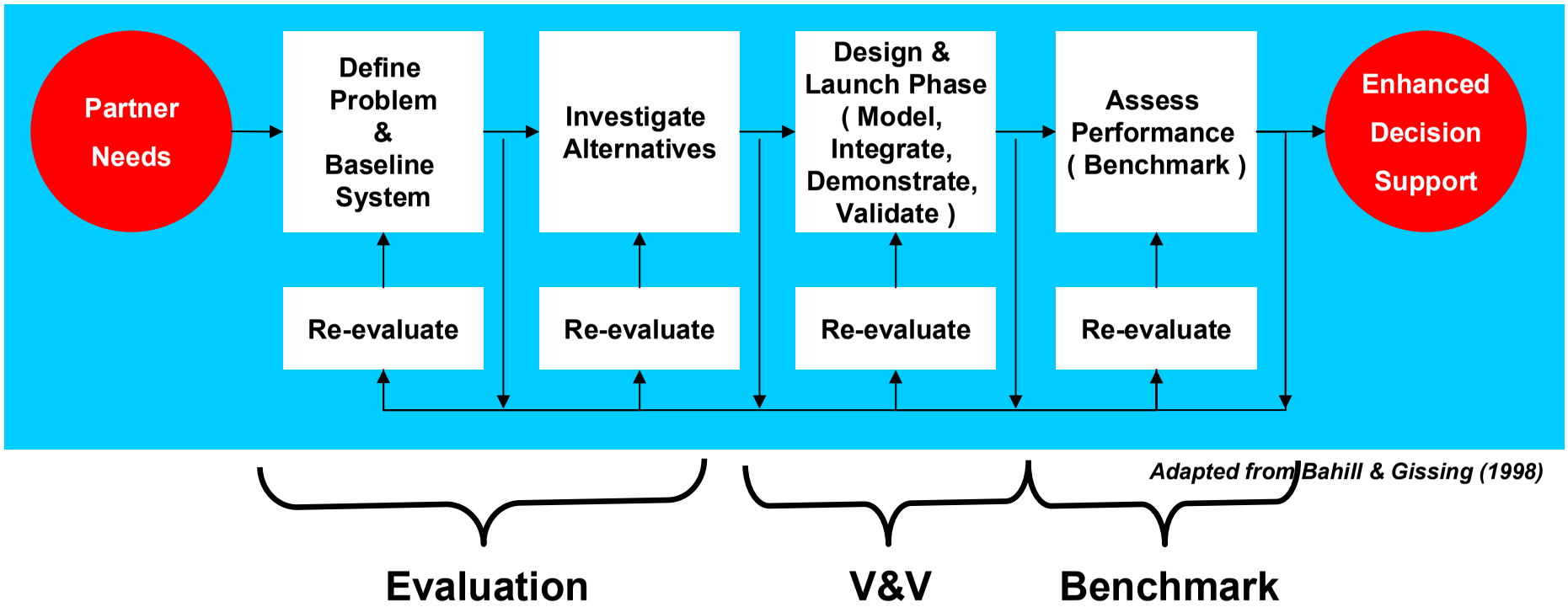
Decision Support Tools – a suite of solutions owned by NASA partners that are used in a variety of problem domains for decision and policy making. These solutions could include assessments, decision support systems, decision support calendars, etc.

Definitions - Based on HQ Integrated Benchmark Solutions Program Plan

http://aiwg.gsfc.nasa.gov

- Evaluation – Identify decision support tools (assessments and DSSs) that have been developed by Federal agencies and other partners that are a priority to citizens of our nation and that can be enhanced by NASA results. Develop the specifications for how the candidate DSS can be augmented by assimilating NASA observations and predictions.
- Verification – A life cycle process to ensure the products being developed meet the stated specifications (functional, performance, and design).
- Validation – A process to ensure the completed products (software, algorithm, model) effectively serve the functional requirements.
- Benchmark – A standard by which a product can be measured or judged (i.e., How did the DSS that assimilated NASA measurements compare in its operation, function, and performance to the earlier version?). The benchmarking process is required to support adoption of innovative solutions into operational environments that affect life and property.

Applications Approach



Systems Engineering Approach

A systems engineering approach leads to scalable, systemic, and sustainable solutions and processes that contribute to the success of the mission, goals, and objectives of each National Application.

Reverse Engineering Paradigm

Assess against existing assets

Translate specs into results

Flood maps
120 cities
FEMA
USGS

Leverage agency research

What missions or ground systems will provide these measurements?

What models or computational technologies are available?

What information systems are necessary?

If not available, specify need to ESTO.

Reverse engr

What measurements are important and why?

Develop specifications that can improve socioeconomic benefits.

Decision Support Tools

Assessments

Workforce Development

Outreach

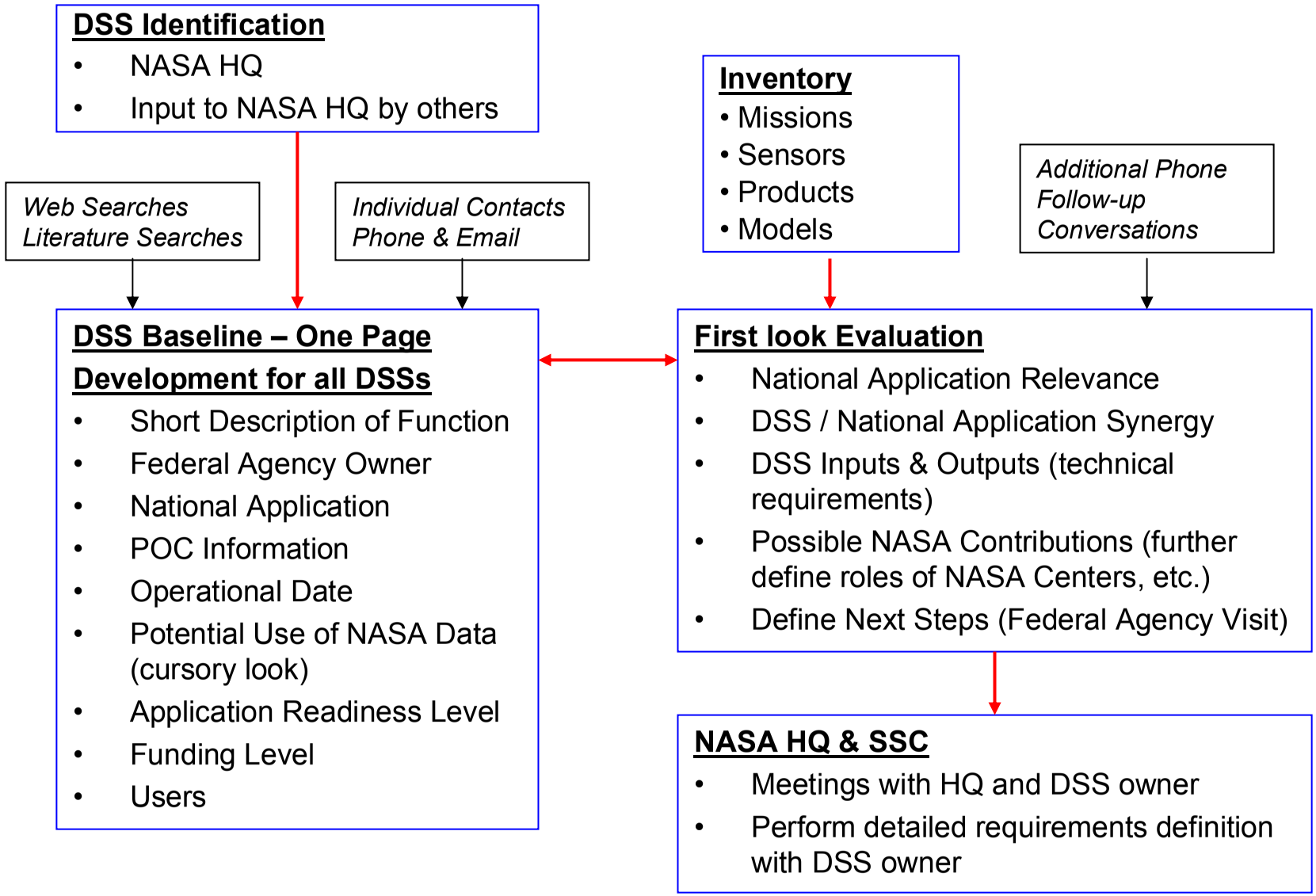
What model outputs are important and why?

Reverse engr

Models
Ecosystems
CDC
EPA

Process flow

DSS Evaluation Process


DSS Identification
• NASA HQ
• Input to NASA HQ by others
Web Searches
Literature Searches
Individual Contacts
Phone & Email
Inventory
• Missions
• Sensors
• Products
• Models
Additional Phone
Follow-up
Conversations
DSS Baseline – One Page Development for all DSSs
• Short Description of Function
• Federal Agency Owner
• National Application
• POC Information
• Operational Date
• Potential Use of NASA Data (cursory look)
• Application Readiness Level
• Funding Level
• Users
First look Evaluation
• National Application Relevance
• DSS / National Application Synergy
• DSS Inputs & Outputs (technical requirements)
• Possible NASA Contributions (further define roles of NASA Centers, etc.)
• Define Next Steps (Federal Agency Visit)
NASA HQ & SSC
• Meetings with HQ and DSS owner
• Perform detailed requirements definition with DSS owner

DSS In-Depth Analysis

DSS Mission

- Operational Requirements
- NASA Partnership Criteria
- Stake Holders
- Funding Profile
- Related National Application
- Relevant NASA Capability

Reverse Engineering Process

- Develop specifications that can improve DSS solution
- Identify important measurements & models
- Asses existing assets
  - What missions will provide measurements
  - What models or computational technologies are available
  - What information systems are necessary
  - Identify gaps for ESTO potential investment

V&V and Benchmarking

V&V

- Integrate NASA capabilities into DSS
- Generate DSS products, solutions, outputs
- Verify Results – compare to technical specifications
  - In situ measurements
  - Cross – comparisons to other DSSs, models, other data sources
- Validate – Does it meet functional desires?
  - Interaction with end users

→

Benchmark

- Measure/Quantify impact of result of NASA input
  - Cost to operate/cost savings
  - Time to product results
  - Accuracy, quality, and reproducibility of results
  - Socioeconomic impact
  - Fills a previously unmet need
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